1.

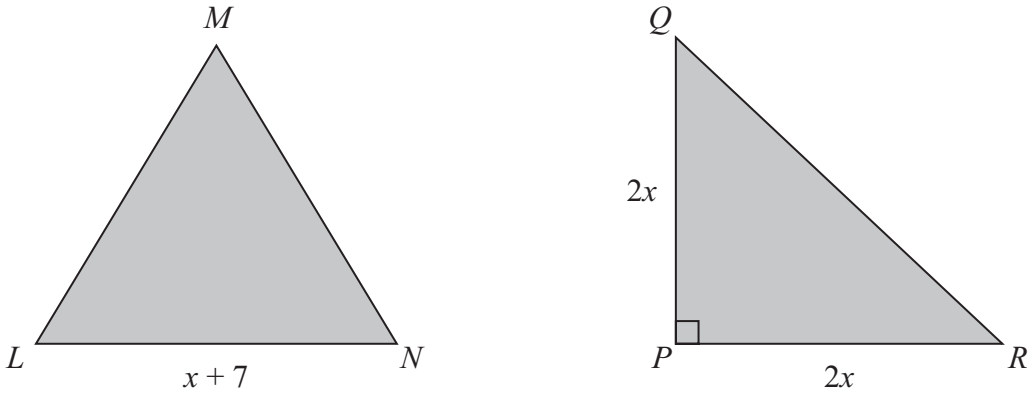


Figure 1

In this question you must show all stages of your working.
Solutions relying on calculator technology are not acceptable.

Figure 1 shows a sketch of a triangle *LMN* and a sketch of a triangle *PQR*.

Triangle *LMN* is an equilateral triangle with sides $(x + 7)$ cm.

Triangle *PQR* is a right-angled isosceles triangle with $PQ = PR = 2x$ cm and angle $QPR = 90°$

(a) Find, in its simplest form in terms of x, the length QR.

(2)

Given that the perimeter of triangle *LMN* is equal to the perimeter of triangle *PQR*,

(b) find the value of x, writing your answer in the form $a\sqrt{2} + b$, where a and b are integers.

(5)

(Total for Question 1 is 7 marks)

2. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

A curve has equation

$$y = x(x + 3)(x - 2)$$

(a) Find, in simplest form, $\frac{dy}{dx}$

(3)

(b) Hence find the range of values for x such that

$$\frac{dy}{dx} \geqslant 2$$

(4)

(Total for Question 2 is 7 marks)

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3. **In this question you must show all stages of your working.**
Solutions relying on calculator technology are not acceptable.

Solve the equation

$$2y^2 + 1 = \frac{15}{y^2}$$

(5)

(Total for Question 3 is 5 marks)